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Turmeric: A Boon for General Health As Well As Oral Health

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ABSTRACT: *Turmeric is a mild digestive, being aromatic, a stimulant and carminative. Turmeric is most powerful natural healer. Curcumin is the active ingredient in turmeric. Turmeric has been used for over 2500 years in India, where it was most likely first used as a dye. The medicinal properties of this spice have been slowly revealing themselves over the centuries. Long known for its anti-inflammatory properties, recent research has revealed that turmeric is a natural wonder, proving beneficial in the treatment of many different health conditions from cancer to Alzheimer's disease. The pharmacological properties and applications of curcumin are rapidly progressing. Clinical studies suggested that curcumin exhibits diverse and potent array of pharmacological effects in almost all of the major organ systems of the human body. Curcumin has: anti-inflammatory activity, anticancer activity, antioxidants activity, anti-diabetic activity, anti-aging, anti-fertility, hepato-protective activity, ophthalmic activity, antibacterial activity, antidepressant activity etc. Curcumin is well tolerated at a very high dose without producing any toxic effect. Nanoparticle encapsulated curcumin increased bioavailability when compared with the conventional curcumin. Curcumin has shows significant effect in the treatment of oral mucosal disorders eg. aphthous stomatitis, oral ulcers, oral leukoplakia, oral lichen planus, oral submucous fibrosis etc. Curcumin affect systemic iron metabolism by reducing the levels of certain metal ions.*

Keywords: *Turmeric; Oral mucosal lesions; Curcumin; Oral health: Herbal medicine.*

INTRODUCTION

Turmeric is an ancient spice, a native of South East Asia, used from antiquity as dye and a condiment. It is cultivated primarily in Bengal, China, Taiwan, Sri Lanka, Java, Peru, Australia and the West Indies. It is still used in rituals of the Hindu religion, and as a dye for holy robes, being

natural, unsynthesized and cheap. Turmeric is in fact one of the cheapest spices. Although as a dye it is used similarly to saffron, the culinary uses of the two spices should not be confused and should never replace saffron in food dishes. Its use dates back nearly 4000 years, to the Vedic culture in India where it was used as a culinary spice and

had some religious significance¹. Curcumin is also a powerful antioxidant; antioxidants scavenge damaging particles in the body known as free radicals, which damage cell membranes, tamper with DNA, and even cause cell death. Antioxidants can neutralize free radicals and may reduce or even help prevent some of the damage they cause. In addition, curcumin reduces inflammation by lowering levels of two inflammatory enzymes (called COX-2 and LOX) in the body and stops platelets from clumping together to form blood clots. It is a valuable home remedy for bronchial asthma¹. The components of turmeric are named as curcuminoids. The active constituents of turmeric are the flavonoid curcumin and various volatile oils including tumerone, atlantone, and zingiberone. Other constituents include sugars, proteins, and resins. Curcumin has been used extensively in ayurvedic medicine for centuries, as it is nontoxic and has a variety of therapeutic properties including antioxidant, analgesic, anti-inflammatory, antiseptic activity, and anticarcinogenic activity². Due to its low rate of absorption, curcumin is often formulated with bromelain for increased absorption and enhanced anti-inflammatory effect³.

HISTORY

The origin of the plant *Curcuma longa* L. (Family Zingiberaceae) is India. The plant is distributed throughout tropical and subtropical regions of the world, being widely cultivated in southeast Asia as a spice, mainly as an ingredient in many varieties of curry powder and sauces, where curcumin from turmeric is a main colouring substance⁴. The rhizome of turmeric has been used in Asian cookery, medicine, cosmetics and fabric dyeing for more than 2000 years⁵. Early European explorers to the Asian continent introduced this important spice to the Western world in 14th century. Use of curcumin as a folk remedy continues today. A poultice of turmeric is also applied to the perineum to aid in the healing of any lacerations in the birth canal. Powdered turmeric is taken with

boiled milk to cure cough and related respiratory ailments and roasted turmeric is an ingredient used as an antidysenteric for children. This ancient remedy is also used in digestive disorders like dyspepsia and acidity, indigestion, flatulence, ulcer, as well as to alleviate the hallucinatory effects of hashish and other psychotropic drugs⁶. It is also used in food and perfumes and as a natural yellow colouring agent as well as an approved food additive to flavour various types of curries and mustards⁷.

CLASSIFICATION

| | |
|---------------|----------------------|
| Binomial name | <i>Curcuma longa</i> |
| Kingdom | Plantae |
| | Angiosperm |
| | Monocots |
| | Commelinid |
| Order | Zingiberales |
| Family | Zingiberaceae |
| Genus | <i>Curcuma</i> |
| Species | <i>Longa</i> |

COMPOSITION⁸

| Constituents | Quantity |
|-------------------------|----------|
| Curcumin(Curcuminoids) | 2-4% |
| Volatile(Essential Oil) | 3-7% |
| Fiber | 2-7% |
| Mineral Matter | 3-7% |
| Protein | 6-8% |
| Fat | 5-10% |
| Moisture | 6-13% |
| Carbohydrates | 60-70% |

PHARMACOLOGICAL PROPERTIES OF TURMERIC

Anti-Inflammatory Properties

Oral administration of curcumin in instances of acute inflammation was found to be as effective as cortisone or phenylbutazone. Oral administration of *Curcuma longa* significantly reduced inflammatory swelling⁹. *C. longa*'s anti-inflammatory properties may be attributed to its ability to inhibit both biosynthesis of

inflammatory prostaglandins from arachidonic acid, and neutrophil function during inflammatory states. Curcuminoids also inhibit LOX, COX, phospholipases, leukotrienes, prostaglandins, thromboxane, nitric oxide elastase, hyaluronidase, collagenase, monocyte chemoattractant protein-1, interferon inducible protein, TNF and interleukin-12. They also decrease prostaglandin formation and inhibit leukotriene biosynthesis via the lipoxygenase pathway¹⁰.

Antioxidant Properties

Water and fat-soluble extracts of turmeric and its curcumin component exhibit strong antioxidant activity, comparable to vitamins C and E. A study of ischemia demonstrated that curcumin pretreatment decreased ischemia-induced changes in the heart¹¹.

Anticarcinogenic Properties

Animal research demonstrates inhibition at all three stages of carcinogenesis-initiation, promotion, and progression. During initiation and promotion, curcumin modulates transcription factors controlling phase I and II detoxification of carcinogens;¹² down-regulates proinflammatory cytokines, free radical-activated transcription factors, and arachidonic acid metabolism via cyclooxygenase and lipoxygenase pathways; and scavenges free radicals¹³. Studies involving rats and mice, as well as in vitro studies utilizing human cell lines, have demonstrated curcumin's ability to inhibit carcinogenesis at three stages: tumor promotion, angiogenesis, and tumor growth¹⁴.

Antimicrobial Properties

Turmeric extract inhibits the growth of a variety of bacteria, parasites, and pathogenic fungi. A study of chicks infected with the caecal parasite *Eimeria maxima* demonstrated that diets supplemented with turmeric resulted in a reduction in small intestinal lesion scores and improved weight gain¹⁵. Another study shows that guinea pigs were infected with either dermatophytes, pathogenic

molds, or yeast, found that topically applied turmeric oil inhibited dermatophytes and pathogenic fungi. Improvements in lesions were observed in the dermatophyte- and fungi-infected guinea pigs, and at seven days post-turmeric application the lesions disappeared. Curcumin has also been found to have moderate activity against *Plasmodium falciparum* and *Leishmania major* organisms¹⁶.

THERAPEUTIC USE OF TURMERIC

It protects against free radical damage because it has a strong antioxidant property¹⁷. It lowers the histamine level and stimulates the production of natural cortisone from adrenal glands. Thus it has a major role in reducing inflammation¹⁸. It protects the liver from a number of toxic compounds such as carbon tetrachloride, galactosamine, acetaminophen and aspergillus aflatoxin¹⁹.

Digestive and Liver Disorders

Turmeric is considered as a digestive bitter and a carminative. It can be added into foods including rice and bean dishes to improve digestion, reduce gas and bloating. It can be taken as a single extract or in the form of digestive bitters, which combine turmeric with other bitter and carminative herbs. Whatever way turmeric is consumed it is beneficial to both the digestive system and the liver. It is said to shrink engorged hepatic ducts, so it can be useful to treat liver conditions such as hepatitis, cirrhosis, and jaundice¹.

Cancer

Recent scientific research confirms that turmeric can cure host of diseases, also they found that turmeric restrains the growth of various types of cancer. Turmeric is used for the treatment of skin cancer or precancerous skin conditions. Both topical and internal uses are beneficial¹.

Atherosclerosis

Turmeric may be helpful in preventing the blockage of arteries that can gradually cause a heart attack or stroke in one of two ways. Turmeric makes

cholesterol levels low and inhibited the oxidation of LDL (bad cholesterol). Oxidized LDL deposits in the walls of blood vessels and contributes to the formation of atherosclerotic plaque¹.

Osteoarthritis

Turmeric may help relieve the symptoms of osteoarthritis because of its ability to reduce pain and disability.

Menstrual Problems of Women

For women who experience monthly menstrual cramps, try using turmeric extract or bitters twice daily for two weeks prior to expected menstruation. Turmeric is an antispasmodic to smooth muscles so it reduces digestive and menstrual cramping¹.

Bacterial Infection / Wounds

Turmeric is useful as an external antibiotic in preventing bacterial infection in wounds.

Eye Disorder

Curcumin may prove to be as effective as corticosteroids in the uveitis (inflammation of the uvea, the middle layer of the eye between the sclera - white outer coat of the eye and the retina - the back of the eye) the type of eye disorder¹.

ORAL USE OF TURMERIC

Dental Pain and Periodontal Problems

Massaging the aching teeth with roasted, ground turmeric eliminates pain and swelling. A paste made from 1 tsp of turmeric, ½ tsp of salt and ½ tsp of mustard oil can be used to treat gingivitis and periodontitis. It is recommended to rub the teeth and gums with this paste twice a day².

Pit and Fissure Sealant

It has been found that tinted pit and fissure sealant is used for applying on tooth surfaces in order to prevent or reduce the incidence of dental caries. This sealant can be produced from a composition containing acrylic monomer and at least one colorant selected from the group consisting of

Annatto extract, turmeric extract, and β -Apo-8.-Carotenal²⁰.

Dental-Plaque Detection System

Plaques are generally stained with dental-plaque staining agents, which contain dyes, to reveal their location. The dental-plaque detection system includes a dental-plaque staining agent, which contains turmeric extracts and curcumin; and a light-emitting apparatus, which gives out light having a wavelength within a range of 250 to 500 nm to an object in the oral cavity where the dental-plaque staining agent is, attached²¹.

Recurrent Aphthous Stomatitis

Reports have shown that in patients who used conventional antiseptic gel, the lesion healed only after the period of time as in previous attacks. They experienced no early reduction in pain or frequency of recurrence. The patients who used curcumin oil reported that ulcers started healing earlier than in previous attacks; there was also early reduction in pain. A follow up for one year has shown no recurrence in these patients²².

Sub Gingival Irrigant

A study shows that 1% curcumin solution can cause better resolution of inflammatory signs than chlorhexidine and saline irrigation as a subgingival irrigant²³.

Mouth Wash

Turmeric mouthwash prepared by dissolving 10 mg of curcumin extract in 100 ml of distilled water and 0.005% of flavoring agent peppermint oil with pH adjusted to 4 was found to be as effective as most widely used chlorhexidine mouthwash. Though chlorhexidine gluconate is further more effective when anti plaque property was considered. The effect of turmeric observed may be because of its anti-inflammatory action. Reduction in total microbial count was observed in both the groups according to a study²⁴.

Oral Lichen Planus

Curcumin shows immunomodulatory effect and provide symptomatic relief and helps in decreasing the size of the lesion in cases of oral lichen planus. The two randomized controlled trials conducted by Chainani Wu et al²⁵ concluded that higher dosages of curcumin (up to 6,000 mg/day) helped a significant number of OLP patients control their symptoms, whereas smaller doses of curcumin (< 2,000 mg/day) have failed to provide relief. In a pilot study conducted by Singh V et al²⁶, curcumin was studied as a treatment option for the treatment of oral lichen planus and positive results were found both in terms of symptomatic relief and decrease in the size of the lesion.

Oral Leukoplakia

Due to its anticancer and anti-inflammatory properties, curcumin is useful in the treatment of oral Leukoplakia. In a phase I clinical trial of patients at high risk for the development of epithelial cancer in several organs, oral intake of curcumin up to 8 g/day led to histologic improvement of oral leukoplakia during 3 months of administration²⁷.

In an in vitro study by Khafif A et al²⁸, chemopreventive effect of curcumin was analysed in normal epithelial cells, oral Leukoplakia cells and squamous cell carcinoma cells. Curcumin was found to be an effective inhibitor of cell proliferation. Another in vitro study by Chakravarti N et al²⁹ also concluded that curcumin has a promising role in inhibition of cell proliferation.

Oral Submucous Fibrosis

Agarwal N et al³⁰ used commercially available turmeric for the treatment of 30 patients diagnosed with oral Submucous fibrosis and found that there is significant decrease in burning sensation but mouth opening was not significantly improved.

In a comparative study of efficacy of curcumin and turmeric oil as chemopreventive agents in oral Submucous fibrosis, Deepa Das et al³¹ noticed significant improvement in clinical signs and

symptoms as well as positive histopathological changes in 48 clinico-histopathologically diagnosed cases of oral Submucous fibrosis. The results were almost equal by use of either of the form of curcumin.

Rai B et al³² conducted a study in which 25 patients with oral Submucous fibrosis treated with curcumin showed significant decrease in burning sensation and improvement in mouth opening. Also, there was significant rise in serum levels of vitamin C and E and decrease in serum levels of malonaldehyde (MDA) and 8-hydroxydeoxyguanosine (8-OHdG). In a study conducted by Hastak et al³³, 58 oral Submucous fibrosis patients were given turmeric in any of the three form i.e. alcoholic extracts of turmeric, turmeric oil and turmeric oleoresin and it was found to be effective in decreasing the number of micronucleated cells both in exfoliated oral mucosal cells and in circulating lymphocytes.

CONCLUSION

Turmeric is a popular spice frequently used in Indian foods and curry. Curcumin (1, 7-bis [4-hydroxy-3-methoxyphenyl]-1, 6-heptadiene-3, 5-Dione) is the most active constituent of turmeric curcuminoids obtained from the rhizome of *Curcuma longa*. Curcumin is classified as a polyphenol compound that gives turmeric its bright yellow colour. Besides being a popular dietary supplement, it is used as a food colouring agent. Curcumin holds a high place in Ayurvedic medicine as a “detoxifier of the body,” and today, science has documented several diseased conditions that can be healed by the active ingredients of turmeric. Curcumin has been found to have antioxidant, anti-tumor, anti-inflammatory, antiviral, antibacterial, antifungal properties, analgesic, anti-allergic, antioxidant, antiseptic and thus has a potential against various diseases.

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